

# Yulin Wang

Ph.D. Student, Tsinghua University

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## Education

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### Department of Automation, Tsinghua University

Ph.D. Student in Pattern Recognition and Machine Learning

2019 – 2025 (expected)

- Advisor: Prof. Cheng Wu and Prof. Gao Huang.

### School of Automation Science and Electrical Engineering, Beihang University

B.Eng. in Automation

2015 – 2019

- GPA **Top 1/231**.
- Awarded “**Shen Yuan**” Medal by Beihang Univ. (**Top 10** of 18,000+ undergraduate students).

## Research Experience

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### Berkeley Deep Drive, University of California, Berkeley

Research Intern

2018

- Advisor: Dr. Ching-Yao Chan.

### Lab of Intelligent Manufacturing, Beihang University

Research Intern

2017 – 2018

- Advisor: Prof. Fei Tao.

## Research Interests

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Yulin Wang focuses on addressing the challenges of **data efficiency** and **computational efficiency** in building large-scale deep learning models (e.g., visual/multi-modal foundation models, generative models, and embodied foundation models for robotics). He draws inspiration from **data diversity**:

- **Data-efficient learning/fine-tuning of large models.** Reducing the expensive cost of collecting high-quality training data or fine-tuning data (e.g., for transfer learning, supervised fine-tuning, or alignment with human preferences) by augmenting the **diversity** of relatively small datasets.
- **Efficient and effective training of large foundation models.** Investigating how deep networks learn to exploit the **diversified** discriminative patterns in data. Based on these insights, developing novel algorithms to train large models more efficiently, stably, and effectively.
- **Computation-efficient inference of large models.** Improving the efficiency of large model inference by adaptively adjusting inference strategies and computational graphs based on the **diversified** test data (e.g., employing spatial-temporal dynamic computation akin to human vision).

## Publications

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Yulin Wang has published a number of works in top-tier conferences & journals in the fields of machine learning and computer vision, including **TPAMI** (6), **IJCV** (1), **NeurIPS** (5), **ICLR** (1), **ICCV** (6), **CVPR** (5), and **ECCV** (2). Two of his papers were selected for “**Oral Presentation**” (acceptance rate: 3-4%) by ICCV and CVPR, respectively. He has collected **more than 2,400 citations** according to **Google Scholar**. In addition, he has actively released the code for his published papers, and has received **more than 1.5k stars** on **GitHub**. The detailed publication list is presented in the following (starting from the next page, categorized by the three sub-topics in “Research Interests”).

## I. Publications (1/4) – Data-efficient learning/fine-tuning of large models

- [1-2] - **Yulin Wang**, Gao Huang, Shiji Song, Xuran Pan, Yitong Xia, Cheng Wu  
**Regularizing Deep Networks with Semantic Data Augmentation**  
*IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI, IF<sub>5-year</sub>=22.2)*, 2022
- **Yulin Wang**, Xuran Pan, Shiji Song, Hong Zhang, Cheng Wu, Gao Huang  
**Implicit Semantic Data Augmentation for Deep Networks**  
*Advances in Neural Information Processing Systems (NeurIPS)*, 2019  
[Code Link \(582 stars\)](#) / [Paper Link \(367 citations in total\)](#)
- [3] Chaoqun Du, **Yulin Wang**, Shiji Song, Gao Huang  
**Probabilistic Contrastive Learning for Long-Tailed Visual Recognition**  
*IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI, IF<sub>5-year</sub>=22.2)*, 2024
- [4-5] - Mixue Xie, Shuang Li, Kaixiong Gong, **Yulin Wang**, Gao Huang  
**Adapting Across Domains via Target-Oriented Transferable Semantic Augmentation Under Prototype Constraint**  
*International Journal of Computer Vision (IJCV, IF<sub>5-year</sub>=14.5)*, 2023
- Shuang Li, Mixue Xie, Kaixiong Gong, Chi Harold Liu, **Yulin Wang**, Wei Li  
**Transferable Semantic Augmentation for Domain Adaptation**  
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR Oral, acceptance rate: 4%)*, 2021
- [6] Yifan Pu, Yizeng Han, **Yulin Wang**, Junlan Feng, Chao Deng, Gao Huang  
**Fine-grained Recognition with Learnable Semantic Data Augmentation**  
*IEEE Transactions on Image Processing (TIP, IF<sub>5-year</sub>=12.1)*, 2023
- [7] Wenxuan Ma, Shuang Li, Jinming Zhang, Chi Harold Liu, Jingxuan Kang, **Yulin Wang**, Gao Huang  
**Borrowing Knowledge From Pre-trained Language Model: A New Data-efficient Visual Learning Paradigm**  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2023
- [8] Shuang Li, Kaixiong Gong, Chi Harold Liu, **Yulin Wang**, Feng Qiao, Xinjing Cheng  
**MetaSAug: Meta Semantic Augmentation for Long-Tailed Visual Recognition**  
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021

## II. Publications (2/4) – Efficient and effective training of large foundation models

- [9-10] - **Yulin Wang**, Yang Yue, Rui Lu, Yizeng Han, Shiji Song, Gao Huang  
**EfficientTrain++: Generalized Curriculum Learning for Efficient Visual Backbone Training**  
*IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI, IF<sub>5-year</sub>=22.2)*, 2024
- **Yulin Wang**, Yang Yue, Rui Lu, Tianjiao Liu, Zhao Zhong, Shiji Song, Gao Huang  
**EfficientTrain: Exploring Generalized Curriculum Learning for Training Visual Backbones**  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2023  
[Code Link \(197 stars\)](#) / [Paper Link \(26 citations in total\)](#)
- [11] **Yulin Wang**, Zanolin Ni, Shiji Song, Le Yang, Gao Huang  
**Revisiting Locally Supervised Learning: An Alternative to End-to-end Training**  
*International Conference on Learning Representations (ICLR)*, 2021  
[Code Link \(89 stars\)](#) / [Paper Link \(88 citations\)](#)
- [12] Zanolin Ni\*, **Yulin Wang\***, Renping Zhou, Yizeng Han, Jiayi Guo, Zhiyuan Liu, Yuan Yao, Gao Huang  
[\*co-first author, supervising Zanolin Ni (junior Ph.D. student)]  
**ENAT: Rethinking Spatial-temporal Interactions in Token-based Image Synthesis**  
*Advances in Neural Information Processing Systems (NeurIPS)*, 2024

- [13] Zanlin Ni\*, **Yulin Wang\***, Jiangwei Yu, Haojun Jiang, Yue Cao, Gao Huang  
[\*co-first author, supervising Zanlin Ni (junior Ph.D. student)]  
**Deep Incubation: Training Large Models by Divide-and-Conquering**  
IEEE/CVF International Conference on Computer Vision (ICCV), 2023

### III. Publications (3/4) – Computation-efficient inference of large models

- [14-17] - **Yulin Wang**, Haoji Zhang, Yang Yue, Shiji Song, Chao Deng, Junlan Feng, Gao Huang  
**Uni-AdaFocus: Spatial-temporal Dynamic Computation for Video Recognition**  
IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**,  $IF_{5\text{-year}}=22.2$ ), 2024
- **Yulin Wang**, Yang Yue, Xinhong Xu, Ali Hassani, Victor Kulikov, Nikita Orlov, Shiji Song, Humphrey Shi, Gao Huang  
**AdaFocus V3: On Unified Spatial-temporal Dynamic Video Recognition**  
European Conference on Computer Vision (ECCV), 2022
- **Yulin Wang**, Yang Yue, Yuanze Lin, Haojun Jiang, Zihang Lai, Victor Kulikov, Nikita Orlov, Humphrey Shi, Gao Huang  
**AdaFocus V2: End-to-End Training of Spatial Dynamic Networks for Video Recognition**  
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022
- **Yulin Wang**, Zhaoxi Chen, Haojun Jiang, Shiji Song, Yizeng Han, Gao Huang  
**Adaptive Focus for Efficient Video Recognition**  
IEEE/CVF International Conference on Computer Vision (ICCV **Oral**, acceptance rate: 3%), 2021  
[Code Link \(210 stars in total\)](#) / [Paper Link \(176 citations in total\)](#)
- [18-19] - Gao Huang\*, **Yulin Wang\***, Kangchen Lv, Haojun Jiang, Wenhui Huang, Pengfei Qi, Shiji Song  
[\*co-first author with my advisor]  
**Glance and Focus Networks for Dynamic Visual Recognition**  
IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**,  $IF_{5\text{-year}}=22.2$ ), 2023
- **Yulin Wang**, Kangchen Lv, Rui Huang, Shiji Song, Le Yang, Gao Huang  
**Glance and Focus: A Dynamic Approach to Reducing Spatial Redundancy in Image Classification**  
Advances in Neural Information Processing Systems (**NeurIPS**), 2020  
[Code Link \(181 stars\)](#) / [Paper Link \(193 citations in total\)](#)
- [20] **Yulin Wang**, Rui Huang, Shiji Song, Zeyi Huang, Gao Huang  
**Not All Images are Worth 16x16 Words: Dynamic Transformers for Efficient Image Recognition**  
Advances in Neural Information Processing Systems (**NeurIPS**), 2021  
[Code Link \(245 stars\)](#) / [Paper Link \(223 citations\)](#)
- [21] Yang Yue\*, **Yulin Wang\***, Bingyi Kang, Yizeng Han, Shenzhi Wang, Shiji Song, Jiashi Feng, Gao Huang  
[\*co-first author, supervising Yang Yue (junior Ph.D. student)]  
**Dynamic Inference of Multimodal Large Language Models for Efficient Robot Execution**  
Advances in Neural Information Processing Systems (**NeurIPS**), 2024
- [22] Zanlin Ni\*, **Yulin Wang\***, Renping Zhou, Rui Lu, Jiayi Guo, Jinyi Hu, Zhiyuan Liu, Yuan Yao, Gao Huang  
[\*co-first author, supervising Zanlin Ni (junior Ph.D. student)]  
**AdaNAT: Exploring Adaptive Policy for Token-Based Image Generation**  
European Conference on Computer Vision (ECCV), 2024
- [23] Zanlin Ni\*, **Yulin Wang\***, Renping Zhou, Jiayi Guo, Jinyi Hu, Zhiyuan Liu, Shiji Song, Yuan Yao, Gao Huang  
[\*co-first author, supervising Zanlin Ni (junior Ph.D. student)]  
**Revisiting Non-Autoregressive Transformers for Efficient Image Synthesis**  
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024

- [24] Yizeng Han, Gao Huang, Shiji Song, Le Yang, Honghui Wang, **Yulin Wang**  
[Dynamic Neural Networks: A Survey](#)  
*IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI, IF<sub>5-year</sub>=22.2)*, 2022  
[Paper Link \(664 citations\)](#)
- [25] Ziwei Zheng, Le Yang, **Yulin Wang**, Miao Zhang, Lijun He, Gao Huang, Fan Li  
[Dynamic Spatial Focus for Efficient Compressed Video Action Recognition](#)  
*IEEE Transactions on Circuits and Systems for Video Technology (TCSVT, IF<sub>5-year</sub>=7.1)*, 2023
- [26] Yizeng Han, Dongchen Han, Zeyu Liu, **Yulin Wang**, Xuran Pan, Yifan Pu, Chao Deng, Junlan Feng, Shiji Song, Gao Huang  
[Dynamic Perceiver for Efficient Visual Recognition](#)  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2023
- [27] Yifan Pu, Yiru Wang, Zhuofan Xia, Yizeng Han, **Yulin Wang**, Weihao Gan, Zidong Wang, Shiji Song, Gao Huang  
[Adaptive Rotated Convolution for Rotated Object Detection](#)  
*IEEE/CVF International Conference on Computer Vision (ICCV)*, 2023

#### IV. Publications (4/4) – Other publications

- [28] Ziwei Zheng, Zechuan Zhang, **Yulin Wang**, Shiji Song, Gao Huang, Le Yang  
[Rethinking the Architecture Design for Efficient Generic Event Boundary Detection](#)  
*ACM International Conference on Multimedia (ACM MM)*, 2024
- [29] **Yulin Wang**, Yizeng Han, Chaofei Wang, Shiji Song, Qi Tian, Gao Huang  
[Computation-efficient Deep Learning for Computer Vision: A Survey](#)  
*Cybernetics and Intelligence (sponsored by the Department of Automation, Tsinghua University)*, 2023
- [30] **Yulin Wang**, Jiayi Guo, Jiangshan Wang, Cheng Wu, Shiji Song, Gao Huang  
[Meta-Semi: A Meta-Learning Approach for Semi-Supervised Learning](#)  
*CAAI Artificial Intelligence Research (sponsored by Chinese Association for Artificial Intelligence)*, 2022
- [31] Wenxuan Ma, Jinming Zhang, Shuang Li, Chi Harold Liu, **Yulin Wang**, Wei Li  
[Making the Best of Both Worlds: A Domain-Oriented Transformer for Unsupervised Domain Adaptation](#)  
*ACM International Conference on Multimedia (ACM MM)*, 2022
- [32] Le Yang, Haojun Jiang, Ruojin Cai, **Yulin Wang**, Shiji Song, Gao Huang, Qi Tian  
[CondenseNet V2: Sparse Feature Reactivation for Deep Networks](#)  
*IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021
- [33] **Yulin Wang**, Rui Huang, Gao Huang, Shiji Song, Cheng Wu  
[Collaborative Learning with Corrupted Labels](#)  
*Neural Networks (NN, IF<sub>5-year</sub>=7.9)*, 2020
- [34] **Yulin Wang**, Yongping Zhang, Fei Tao, Tingyu Chen, Ying Cheng, Shunkun Yang  
[Logistics-aware Manufacturing Service Collaboration Optimization towards Industrial Internet Platform](#)  
*International Journal of Production Research (IJPR, IF<sub>5-year</sub>=8.3)*, 2019

## Selected Awards and Honors

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- National Scholarship, Ministry of Education of China (4th time, Top 2% in Tsinghua University) 2023
- ByteDance Scholarship, ByteDance Ltd. (10 Ph.D. students in China) 2022
- Microsoft Research Ph.D. Fellowship, Microsoft Research Asia (12 Ph.D. students in the Asia-Pacific region) 2022
- “Li Yanda” Scholarship, Tsinghua University (4 Ph.D. students in the Department of Automation, Tsinghua University) 2022
- Baidu Scholarship, Baidu Inc. (10 Ph.D. students worldwide) 2021
- CCF-CV Outstanding Young Researcher Award, China Computer Federation (CCF) (3 Ph.D./MS students in China) 2021
- National Scholarship, Ministry of Education of China (3rd time, Top 2% in Tsinghua University) 2021
- Outstanding Oral Presentation, Doctoral Students Forum, Tsinghua University 2021
- Travel Award, NeurIPS 2019
- “Shen Yuan” Medal, Beihang University (Top 10 of 18,000+ undergraduate students in Beihang University) 2018
- National Scholarship, Ministry of Education of China (2nd time, Top 2% in Beihang University) 2018
- National Scholarship, Ministry of Education of China (1st time, Top 2% in Beihang University) 2017
- “Gong Xin” Innovation Scholarship, Ministry of Industry and Information Technology of China 2017 (Top 1/231 in Beihang University)
- First Prize, “Zhou Peiyuan” Mechanics Competition for Undergraduate Students (Top 0.3%) 2017
- First Prize, National Undergraduate Mathematical Contest in Modeling (Top 0.2%) 2017
- Scholarship for Outstanding Academic Performance, Beihang University (Top 5% in Beihang University) 2016 – 2019

## Industrial Applications

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### China Mobile Research Institute

*Project – Efficient Inference of Deep Learning Models based on Dynamic Networks* 2021 – Present

- Detecting harmful online images/videos (e.g., violent, pornographic, or other adult-only contents):
  - Improving real throughput by 3.4x without sacrificing accuracy or increasing inference cost.
- Smart city scenario – real-time surveillance systems (e.g., detecting the violent behaviors of pedestrians):
  - Reducing real latency by 3.0x on practical edge computing hardware without sacrificing accuracy.
- Award for *Frontier Exploration*, China Mobile Research Institute, 2023

### Ministry of Science and Technology of China under Grant 2018AAA0101604

*Sub-project – Data-efficient Machine Learning for Production Line Status Monitoring* 2018 – 2023

- Fault diagnosis for real production lines:
  - Improving the generalization performance of deep networks significantly.

## Academic Service

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- Reviewer for TPAMI, IJCV, TCYB, TNNLS, TCSVT, Pattern Recognition, TMLR, ...
- Reviewer for ICML, NeurIPS, ICLR, CVPR, ICCV, ECCV, AAAI, ...
  - **Outstanding Reviewer**, CVPR, 2021
- Co-sponsor of the Special Interest Group on Dynamic Neural Networks, Beijing Academy of Artificial Intelligence (BAAI).
  - <https://littlepure2333.github.io/dynamic-neural-network>
  - Core members include more than 20 researchers from 8 universities. We have organized more than 30 academic reports and tutorials. The cumulative audience has exceeded 1,000.

## Invited Talks and Presentations

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- 2023.09, Tsinghua-Berkeley Shenzhen Institute, Tsinghua University, Dynamic Inference of Neural Networks
- 2023.02, School of Automation, Beijing Institute of Technology, Vision Transformers Meet Dynamic Inference
- 2021.12, PRCV 2021, Dynamic Deep Networks for Reducing Spatial Redundancy
- 2021.10, School of Computer Science, Fudan University, Dynamic Deep Networks for Reducing Spatial Redundancy
- 2021.09, Aibee (invited by Yuanqing Lin), Semantic Data Augmentation
- 2021.06, AI Time, Locally Supervised Deep Learning
- 2021.04, Beijing Academy of Artificial Intelligence, Dynamic Image/Video Recognition
- 2021.03, ByteDance Ltd., Semantic Data Augmentation
- 2020.11, Qingyuan Seminar, Glance and Focus Networks
- 2020.06, Huawei Technologies Ltd., Glance and Focus Networks
- 2019.10, School of Computer Science and Engineering, Beihang University, Semantic Data Augmentation